

## **Richard Coppola, D.Sc.**

Dr. Coppola received his degree in Electrical Engineering from the Massachusetts Institute of Technology where he began electrophysiology research in the Communications Biophysics Laboratory. He has a Doctor of Science degree from the George Washington University. For the past thirty years he has been involved with Neuropsychiatric research at the NIMH. Over this time he has authored or co-authored well over 100 articles. He has received numerous awards including the Commissioned Corps Commendation and the Outstanding Service Medals for innovations in brain imaging research, as well as the NIH Directors Award. His status in the field is recognized by membership on numerous editorial boards including Clinical Neurophysiology (formerly The EEG Journal), and a founding editor of Brain Topography. Dr. Coppola was one of the pioneers of high spatial resolution EEG analysis and has been responsible for refinements in radial current density methods, cortical imaging and the application of task activation strategies in functional neuroimaging. He founded the EEGSYS Consortium, an international group of laboratories utilizing EEG analysis methods developed in his lab.

In addition to his appointment in the Clinical Brain Disorders Branch, Dr. Coppola is Director of the NIMH MEG Core Facility. Under his guidance this facility has installed the latest state of the art whole head magnetoencephalography system. This 275 channel instrument is an important compliment to the neuroimaging program of the Institute. Within CBDB Dr. Coppola is responsible for the electrophysiology component of the Sibling project. He has written the MEMTASK, WMT, and CRT/RT and tasks used both in the sib project and with the fMRI group. Dr. Coppola is also involved with both structural and functional MRI imaging. He has been responsible for methodological research with landmark analyses and other morphometric techniques and in analysis system design for anatomical studies. His collaboration with the fMRI group includes task design and implementation as well as consultation on signal processing methodology. Dr. Coppola has also used his image processing background to tackle the basic methodology and analysis of the Gene Filter array experiments.

## **Research Interests**

Dr. Coppola's research interests are centered on the investigation of brain mechanisms underlying cognitive behavior and its dysfunction.

The flood of brain imaging studies from advances in fMRI has resulted in ever more subtly defined brain areas. Each refinement of task variation seems to yield an increasing fractionalization of brain related areas. This differentiation is important for understanding associated cognitive dysfunction in patient groups; however, it does not necessarily yield more knowledge into the underlying neurophysiological mechanisms.

The ability to investigate the temporal dynamics of underlying brain activity is necessary to make further progress. Information processing or transfer in the brain is not necessarily associated with increased neural activity. Information processing may well be related to the phasic dynamics of neural activity.

It may be that the hypo- and hyper-function, inefficiency, and varying activation patterns seen in patient groups reflects underlying network pathology. The millisecond

temporal resolution of electrophysiology allows the investigation the associated network dynamics and better understanding the information flow between areas, the binding problem, neural codes, and their relation to behavior.

### **Representative Selected Recent Publications**

Bressler, SL, Coppola, R, Nakamura, RK, Episodic multi-regional cortical coherence at multiple frequencies during visual task performance, *Nature*, 366:153-156, 1993

Jansma JM, Ramsey NF, Coppola R, Kahn RS: Specific versus nonspecific brain activity in a parametric N-back task, *Neuroimage*, 1112:688-697, 2000

Callicott, JH, Bertolino, A, Mattay, VS, Langheim, FJP, Duyn, J, Coppola, R, Goldberg, TE, Weinberger, DR: Physiological dysfunction of the dorsolateral prefrontal cortex in schizophrenia revisited, *Cereb Cortex*, 10:1078-1092, 2000

Winterer G, Egan MF, Radler T, Hyde T, Coppola R, Weinberger DR: An association between reduced interhemispheric EEG coherence in the temporal lobe and genetic risk for schizophrenia, *Schizophr Res.* 49(1-2):129-43, 2001

Fife, AA, Vrbe, J, Coppola, R: A 275 channel whole-cortex MEG system, *Proceedings 13<sup>th</sup> International Conference on Biomagnetism*, 912-915, 2002